Megaliths, Music & the Mind - The Latest in Archaeoacoustics

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"The sapient paradox: can cognitive neuroscience solve it?" This question was posed when the McDonald Institute for Archaeological Research at the University of Cambridge initiated a conference devoted to the theme "Archaeology meets neuroscience".[i] Colin Renfrew's keynote article in the publication from that conference focuses on what he calls the "sapient paradox", a puzzle that has been a thorn in the side of prehistory researchers for some time. In a nutshell, the question seems to be: why did humankind, after 200,000 years of nomadic hunting and gathering, begin building stone monuments, which prompted development of agriculture, resulting in the settled lifestyle that sent us into Western civilization?[ii]

There is no question that something happened 11,000-12,000 years ago in Anatolia. By putting Archaeoacoustics into the mix, we may have an answer.

Researching a subject about prehistory that cannot be photographed or handled requires input from a wide range of disciplines combined with informed observation. Those of us working with Archaeoacoustics: the archaeology of sound in ancient ritual and ceremonial spaces, have always thought that the next step was a collection of on-site biofeedback. Happily, Neuroscience is now filling in the gap of knowledge about the psycho-physiological impact of certain resonant sound which is present in the world's oldest monuments. Add that to new discoveries in Anatolia, and a solution for the "Sapient Paradox" practically leaps right out of the stone.

A paper published in 2008[iii] is recognized as the first official source indicating an effect on brain activity of sound in a specific frequency that has been measured in various megalithic enclosures. While a range of 90 to 130 Hz is the target area, this report cites abrupt changes at 110 Hz in a small group of volunteers. Thanks to the internet, this number has taken on a cultish following and prompted wild speculation about all the ways and places that 110 might

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be significant. This is the sort of stuff television shows are made of, but it is not grounded in science.

What has been scientifically detected is a "megalithic range" for highest resonance between 90 and 130 Hz in stone chambers, which has also been confirmed in Malta's incomparable Hal Saflieni Hypogeum. An estimated 2000 tons of stone were removed to create this place, by the same people who built the megalithic temples above ground on the Mediterranean islands of Malta and Gozo. By virtue of being undetected underground until 1902, Hal Saflieni is still acoustically intact. We hear sound in there today exactly as it was heard by the folks who were using it 5000 years ago, and it can be hair-raising.[iv] Since its discovery, a sort of mythology has been built up about the way sound behaves in Hal Saflieni. Echoes that last as long as 13 seconds and sound waves that circle around the walls create a sonic atmosphere that is difficult to describe.

One chamber called the Oracle Room, functions as a giant resonator. There is a high carved out shelf curving around the dead end of the chamber that seems to serve no purpose but to channel sound waves. The remains of red ochre on the ceiling in this chamber are an intricate pattern of disks and curls that begin above a side compartment and spin out like some kind of prehistoric musical notation, stopping at the entrance portal that frames more finely carved halls beyond.

The side compartment was cut into the wall of the eggplant-shaped Oracle Room at face height. It has been said that a male voice speaking into this niche is heard throughout the three stories of the underground complex in a way that is far different from a female voice.

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There is a scientific explanation for it. Like Newgrange passage tomb and every other tested megalithic site, the range for standing wave resonance in Hal Saflieni is within the range of a bass baritone. Basically, it means that in Hal Saflieni, the echo of a deep voice is occurring at maximum strength in those pitches.

Actually the acoustics of Hal Saflieni are even more complex, with a second peak and loads of low frequency vibration that is beyond human hearing, although one might be able to feel it.[v][vi] Try to imagine standing in that space in the presence of sound in the range of that standing wave. It's like being inside a giant bell. The air is vibrating; the walls and floors and ceilings are vibrating; the sound is swimming all around and can be felt in the tissues of the body. There can be a sort of buzzing in the ears that one sometimes gets when singing along with the radio in the car, when a pitch has been exactly matched. It's mesmerizing. When it stops, this writer always wants to say "do it again."

5,000 years ago, visitors to this site shared it with the bones of their ancestors which were kept here, treated with red ochre and placed into communal beds, as if they were planted in some sort of rebirth ritual. That would fit the ideology of the time. Workers in the space, even talking to each other, would have been exposed to the acoustic effects. Quite a bit of the architecture in Hal-Saflieni suggests features of our performance spaces today. Considered with artifacts recovered from this site, it is clear that something more than interment of the dead was going on in here.

It is difficult to imagine that human beings would let the potential a sound phenomenon such as that in Hal Saflieni go unexploited. If it's impressive today, for people who have answers for everything. the thought of what they might have created in here thousands of years ago is extraordinary. Were they listening for the voices of the dead, or perhaps spirits of the earth? There would have been an aroma, as well as an echo, creating a very sensory and emotional experience. We now know that while the goosebumps were rising, dopamine was being released in their brains.

A program launched by soprano Renee Fleming in collaboration with the National Institutes of Health (NIH), with the participation of the National Endowment for the Arts (NEA) provided inspiration for a deeper look into what has been happening with sound in Neuroscience.[vii] New information is flooding in every day about the complex relationship of music/sound and brain activity. Harvard Medical School neurologist and psychiatrist David Silbersweig says that music activates many different parts of the brain.[viii] The revelations are stunning but none so exciting as one from Johns Hopkins University, where researchers have identified a relationship between music and dopamine release. There is a lot to say about how this can be applied to what was going on in prehistory with the raising of the first megalithic monuments and the sound behavior inside them.

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According to Harvard Medical School, Dopamine is most notably involved in helping us feel pleasure as part of the brain's reward system. Sex, shopping, smelling cookies baking in the oven — all these things can trigger dopamine release, or a "dopamine rush." This feel-good neurotransmitter is also involved in reinforcement. That's why, once we try one of those cookies, we might come back for another one (or two, or three). The darker side of dopamine is the intense feeling of reward people feel when they take drugs, such as heroin or cocaine, which can lead to addiction."[ix]

Dating to ca. 10,000 to 11,500 years ago, the Göbekli Tepe and newly discovered Karahan Tepe sites in Anatolia are hallmarks of the something that sparked monumental change.[x] Both sites exhibit characteristics that suggest that when they were intact, the acoustics would have paralleled those in Hal-Saflieni.[xi] Both sites could easily have offered an experience so exceptional for their ancient visitors that it released chemicals in their brains. . . the sort of chemicals that would bring them back for more.

There is much more to be said when one begins processing these connections. Archaeology and Neuroscience are a good start for solving the puzzle of the Neolithic in the west. Our learning in the 21st century, however, is sorted by necessity into so many compartments that we needed a new selective umbrella like Archaeoacoustics to assemble them.

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